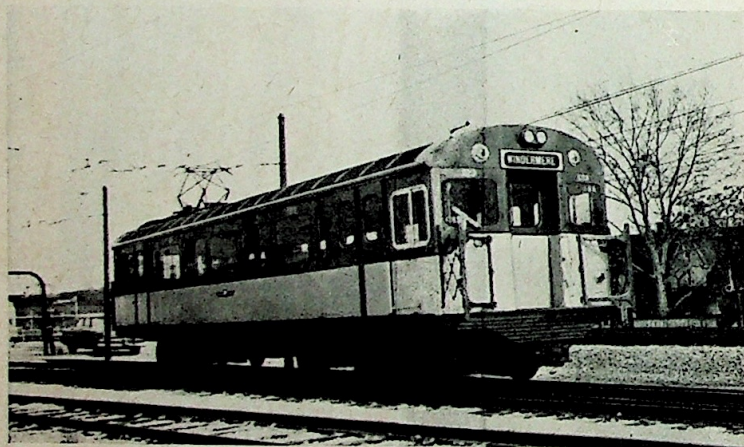


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THE FUTURE AND RAPID TRANSIT

by

B. J. PRIGMORE, M.A., M.Sc., A.M.I.E.E.



Rapid Transit at its ultimate development. A car on the new Cleveland (U.S.A.) Rapid Transit.



LIGHT RAILWAY TRANSPORT LEAGUE,
LONDON, N.W.2.

1959.



"Park and Ride," on the Shaker Heights Rapid Transit, Cleveland,
U.S.A.

The Future and Rapid Transit.

Preface.

"If public transport in major cities is to survive in a healthy condition it must sell time more efficiently so that the public will use it in preference to private transport simply because it happens to be quicker. Under present conditions one good way to do this effectively is to *make increasing use of systems of transport which employ a private right of-way.* This trend may be observed in many principal cities throughout the world." (Our italics.)

(' Modern Transport,' 24th August, 1957.)

Introduction.

WITH THE IMMINENCE OF THE ATOMIC AGE, WHEN ELECTRICITY generated within this country will become plentiful and cheap, and with the increasing scarcity and unreliability of water-borne oil supplies from abroad, it behoves all users of other forms of energy who can electrify their plants or systems to do so at once: those who do so will obviously be best placed to reap all the benefits of atomic power immediately it becomes available. These benefits, which arise mainly from the use of electricity rather than oil or other fuels, will increase even further in value as the price of electricity becomes relatively even lower than now. Who knows, too, if it may not one day become government policy that oil should only be used for those purposes for which electricity is totally unsuited?

Urban transport offers great scope for such electrification as worthwhile new projects, or, in some cases, as extensions and upgradings of existing systems. In these a great contribution to the harnessing of atomic power to provide high-capacity urban transport, and to give progressive reduction of congestion by freeing the roads from urban transport loads, can be made by the electric rapid transit installation—a rail installation on a 20 ft. wide strip, possibly at the centre of a dual carriageway on which a fast and frequent service of modern vehicles is operated.

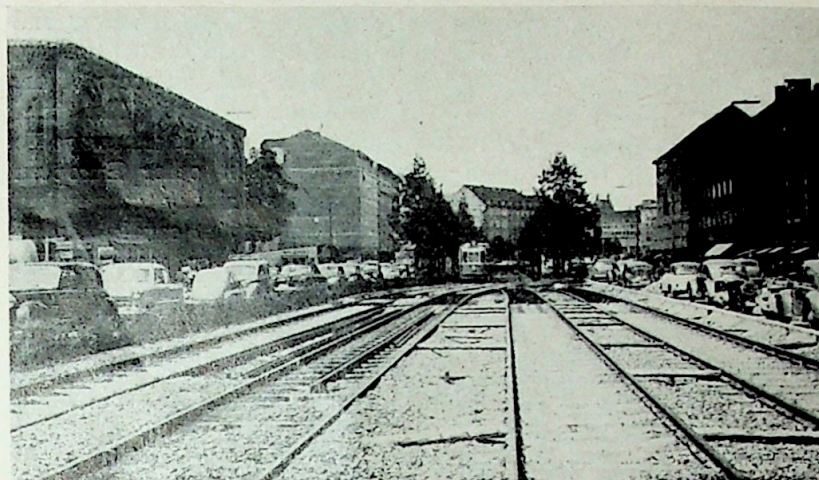
What is Rapid Transit?

To show that rapid transit meets a need not truly met by any other form of transport it is appropriate to survey the accepted forms of urban and suburban transport, and then to show their relation to rapid transit.

The Suburban Railway is well known: it takes large numbers of people from relatively distant areas to a number of termini on the edge of the central area. With its widely spaced stops and high speeds it gives good service to dormitory communities up to about 50 miles from their main centre: it is not intended to give door to door service, and, important to note, needs feeder or distributor services at both ends of its routes. It is thus apparent that a true suburban railway cannot, unaided, meet the transport needs of a large city.

The Underground, "Metro," or City Railway is also well known: the most appropriate example is probably in Paris. Its true function is to carry immense numbers of people from the inner suburbs right into the central area and to provide rapid transport *within* the urban area. With its closely spaced stops it cannot have high average speeds but, being on its own right of way (usually in a tunnel), it has higher speeds than surface transport, which suffers from road congestion, and whose function the "Metro" somewhat overlaps. The weakness of such a "Metro" is that its high capital cost makes it uneconomic unless traffic density is very high, as only occurs in cities suffering from overcrowding and congestion. Much of London's Underground must be excluded from this discussion, for its outer suburban extremities (especially on the Central Line) tend to change its character and result in appreciable overloading on its inner sections.

The City and Suburban Tramway, which is very effectively applied in many European cities, such as Basle and Brussels, gives essentially a high-capacity short-distance service: it takes inner suburban dwellers from home to work, and feeds the suburban railway services mentioned above. Despite its potentially high performance (shown when private right of way is made available), it is much hampered by other street traffic. In many cities in which tramways are imaginatively operated (as, for instance, Brussels and Zurich), they enforce four-lane use of the roads and contribute both to street capacity and safety. In Zurich the potential passenger capacity of 75 tram-trains an hour, in single file, is 15,000 people, a load which, if carried by buses, would require a much greater share of the available space and turn congestion into chaos.



Large-scale Urban Transport Reservation (Sonnenstrasse, Munich, Germany).

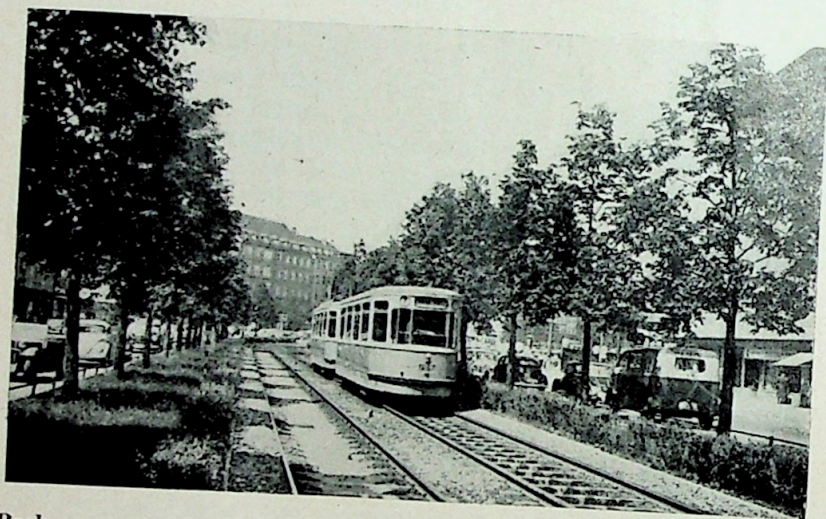
The suburban tramway, with larger and faster vehicles is more to be compared with an inexpensively constructed suburban railway. Though very effective in its sphere, as at Cologne, its services are excessively affected by the congestion of a city centre: they thus often terminate at the edge of the city centre (as the Forchbahn at Zurich Stadelhofen), whence their traffic is supplied or distributed by the city tramways.

The Trolleybus and Motor Bus, especially the latter, are taken for granted in Britain, and attempt to handle most of the traffic in many large towns; consequently, there is much dissatisfaction over local transport services. The place for the bus is where services need only be infrequent and cannot justify the interest charges on fixed equipment. Where somewhat more frequent services are needed the trolleybus may become more economic, although the bus has the advantage (to the operator) that its services can be withdrawn without loss of use of assets should the traffic decrease appreciably.

The place of Rapid Transit is in all those cities which are too large to be effectively served by buses, yet which cannot support the two otherwise necessary complementary networks of a suburban railway on the one hand, and a "Metro" city railway on the other. In the suburbs the rapid transit system takes the place of a suburban railway, whilst in the city it serves the same purpose as the "Metro." Its total size (by contrast with the position in London) is such that it can, successfully, combine the two functions.

Rapid Transit thus combines many features of the tramway and the railway. In the suburbs it is an economically constructed railway, wholly segregated and yet following the roads and gradients of the country more freely than can a conventional railway. The outer sections of the Riehen and Pratteln routes of the Basle tramways do exactly this, and many other examples occur in other European cities. In the city, rapid transit is an economically constructed "Metro:" it may use the site of a disused railway or canal; may be on the central strip of a new dual carriageway road, or, more usually, as in Oslo, will be in a mile or two of subway, with stations appropriately placed.

Depending on the traffic, a frequent service of single cars, with, possibly, conductors on the vehicles may be operated in conjunction with open stations (or "halts"): if traffic warrants, trains of several cars may be operated in conjunction with closed-in stations as in railway practice. Both are done, at different times of day, on one and the same system, in Cleveland, U.S.A.

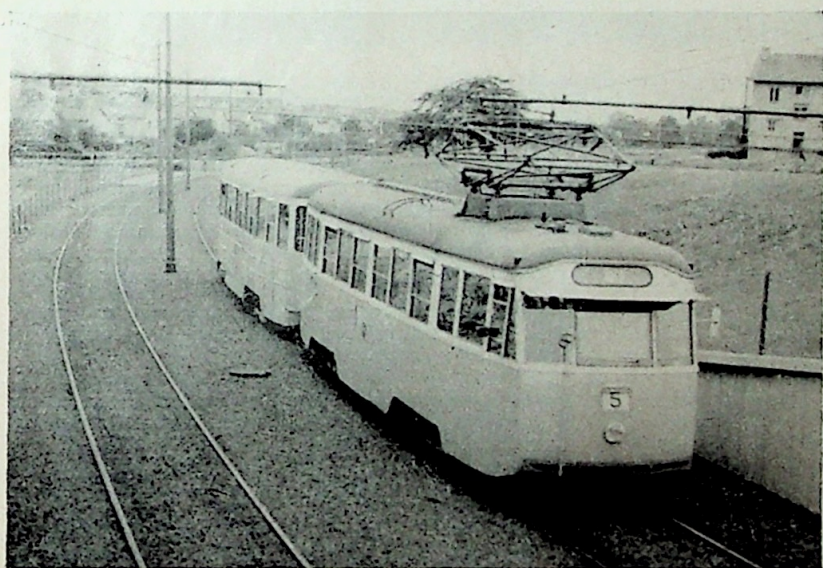


Parkway reservation in town, if space permits (Sonnenstrasse, Munich, Germany).

The first and essential feature of rapid transit is that, whatever economies in construction and operation may be adopted to render it feasible, its route should be entirely segregated from other traffic: should any crossing or mingling be unavoidable except at very great expense, the signalling and traffic rules should give priority to rapid transit vehicles in view of their large capacity and the importance of their contribution to urban transport.

The second, and advisable, feature of rapid transit is that it should offer a frequent service of comfortable vehicles: only in this way will it attract a maximum of traffic, leaving to be carried on the roads by other vehicles only those loads (passenger and goods) for which they are the more suited. With these features will public transport attain the standards suggested by 'Modern Transport' in our preface.

The relation between City Railway, Rapid Transit and Tramway should be fluid, the rapid transit system taking more of the features of the one or the other as traffic changes dictate. In this way, properly applied rapid transit can be changed to suit its duty: if traffic increases through the years, no inconvenience need arise, for the method of operation will be changed to suit. In Stockholm, one of the few cities to have a progressive local transport plan, the increase in traffic on suburban tram route No. 11 was intelligently anticipated; tunnels were built in the city and, largely on the same rails, the route became of "Metro" type, now Tunnelbana line 11.



Private track in the suburbs, 1956 (Gothenberg, Sweden).

A rapid transit system should be fully integrated into the broader pattern of local transport, as, in particular, is the Toronto Subway, which replaced an overloaded city tramway: it has several of its stations laid out for interchange traffic with feeder tramways and bus routes, transfer tickets being universally available.

In this way, then, rapid transit, evolving as conditions change, can well serve those several cities for which buses are patently insufficient but for which the double network of suburban and city railways would be unjustified.

A British Proposal.

That the theme just mentioned is beginning to be appreciated in Britain is shown by the advance statement for the projected Birmingham Rapid Transit, which reads as follows ('Elec. Times,' 15th November, 1956, p. 769).

"ELECTRIC RAILCAR PLAN FOR BIRMINGHAM."

"A report on a proposal for a system of fast electrical railcars in Birmingham is soon to be studied by the city's traffic conference. The idea of a rapid transit system of this type, utilising central roadway reservations in the suburbs and tunnels in the city centre, was first put to the conference over a year ago. It was then referred to the city engineer and surveyor for a report: since it was requested, several factors favourable to such a transport system have appeared.

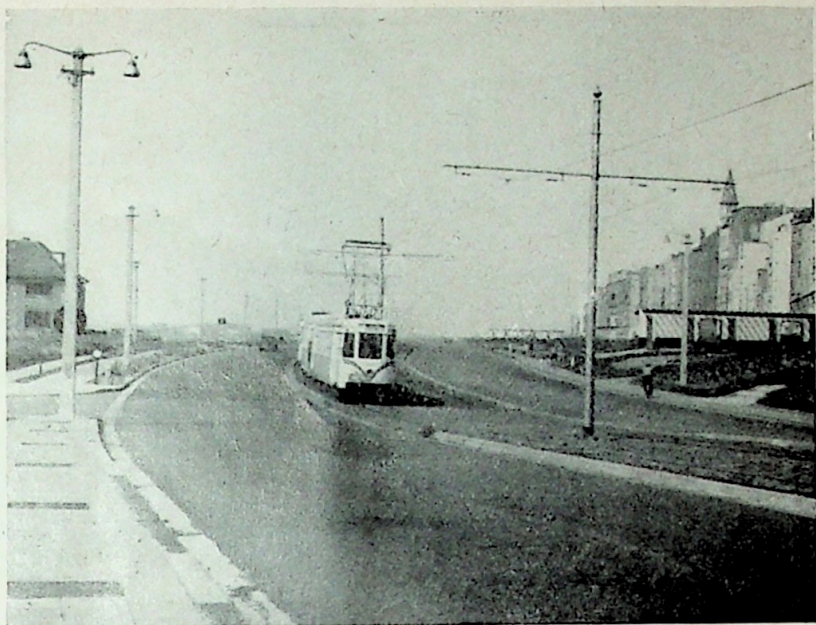
The cost of tunnelling, thought to be £4 a mile, is now found to be less than £1 a mile. The Suez Canal dispute has underlined the possible danger of placing entire reliance for the city's transport on imported diesel fuel. Costs of oil have risen more steeply than electricity, while nuclear electricity generation is expected in Birmingham to widen the gap farther. In addition, a planned inner ring road will take 20 years to complete, whereas an electric rail system could be built, eight miles out to the city's south-western boundary, in four years: on its route would be two miles of tunnel.* Within ten years the railway could be extended a similar distance to the north-east; and later, further radial routes might be linked by an outer circle electric line.

Diesel buses would operate feeder services, while inexpensive car parks could be made on open land away from the city centre: motorists could then complete their journeys by the electric railcars.

If Birmingham adopts this scheme as a way out of its traffic congestion it will join the group of overseas cities, such as Toronto, now developing electric railways."

* The rest of the site reservation is already in existence.

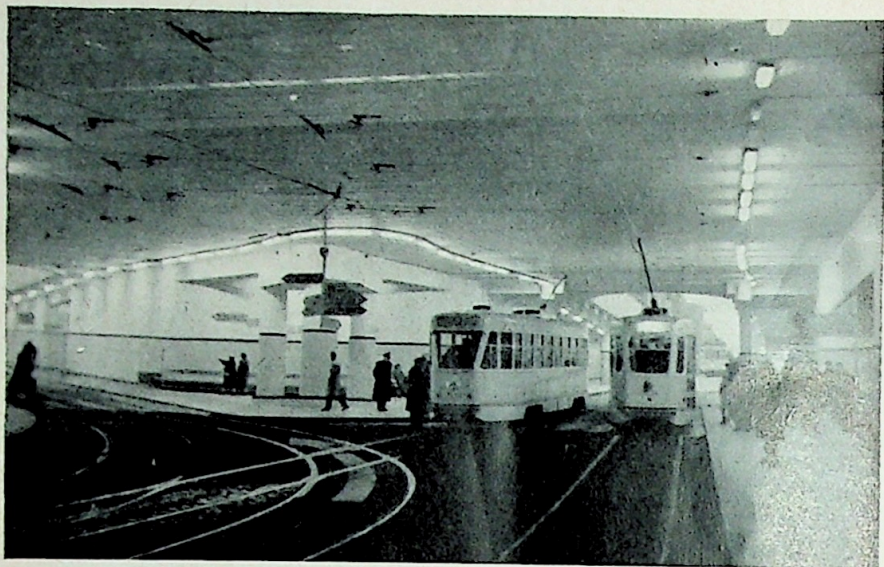
In thus summarising the case for a properly operated rapid transit line as the backbone of an urban transport system, this extract shows how rapid transit is an economic and effective means of urban transport. Use of such a system proves advantageous to the members of the community it serves—as citizens, as ratepayers and as passengers—and also to the operators and operatives: all concerned will find benefits from the adoption of rapid transit, as the rest of this booklet aims to show.



The minimum reservation with rails and electricity (S.N.C.V., Belgium).

Urban Transport Capacity and Street Congestion.

The main requirement of any large urban transport system is capacity for handling peak-hour traffic. Since, with conventional bus (or trolleybus) undertakings, street congestion is at its worst at peak hours, the peak-hour problem becomes doubly severe. The bold solution, to which increasing recourse must be had, is to remove the competition for road space by other vehicles. This would be achieved, not by the repressive method of banning other vehicles, but by the progressive method of setting aside part of a road (if it be wide enough) or, in extreme cases, part of the space beneath the road, as a 20 ft. urban transport reservation, to remove the bulk of public transport from the roads. All one is doing, basically, is to segregate public urban transport into two lanes, freeing the rest for other vehicles. Since loads are large, confining the traffic to a minimum-size reservation means that the best use must be made of it; large or coupled vehicles must thus be used. Manual steering will not be possible in the minimum width lane made available, and only by using rails for steering can safety be assured. Electric traction will be the most



Public Transport Subway (Brussels, Belgium).

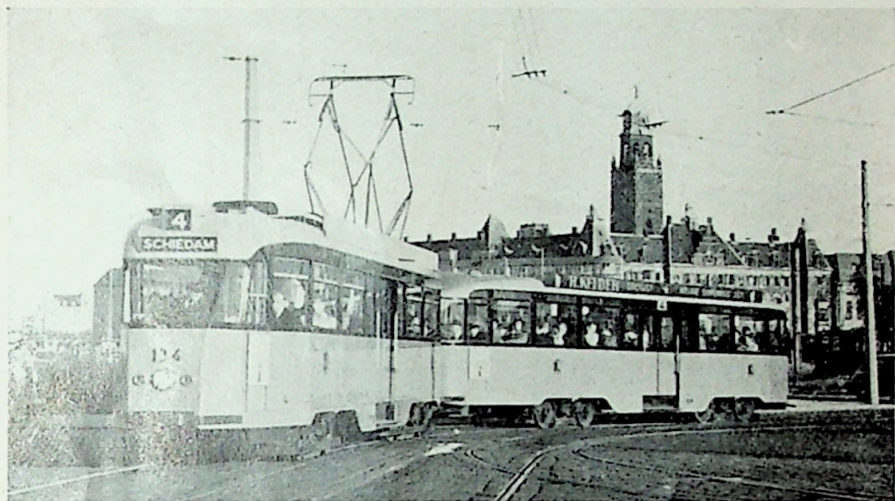
economic for the loads envisaged. An intense service of coupled rapid transit cars holding 100 or more passengers each, on a 10 ft. strip (each way) will thus readily deal with large crowds whilst occupying a minimum of valuable city centre space. These vehicles are thus more effective in providing passenger capacity than even a 70-seat trolleybus, let alone the 56-seat bus at present used so widely.

Just as the suitability and efficacy of London's Underground in the congested capital city is unquestioned, so also should be the potentiality of rapid transit to provide a service of comparable frequency and reliability under suitable conditions.

At the 1956 British Electrical Power Convention on "Electricity and Transport" (Proceedings, p. 472), Mr. J. H. Cansdale stated that even surface tramways (with large vehicles and the advantages of rails to ensure that they do not occupy more than one traffic lane) had a capacity 35 per cent *greater* than the 10,000 an hour of a trolleybus, whilst a fully reserved urban transport system, using rails and electricity, could carry 20,000 an hour: i.e. twice as much as a line of buses, yet with the same occupation of surface space.

Rapid transit cars, by their very nature, must have high acceleration and good, smooth braking, so as to maintain high average speeds even when stops are closely spaced. The high-capacity rapid transit system

is thus an ideal backbone for an urban transport undertaking of any appreciable size. In fact, even the 'Commercial Motor' in May, 1955, is unequivocal that "for moving large crowds in a minimum of time the trolleybus is surpassed only by the tram" . . . and it is the most modern form of railed electric vehicle to which we also refer.

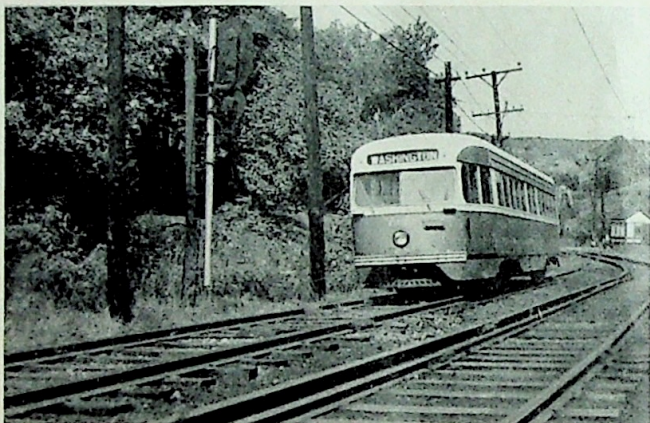
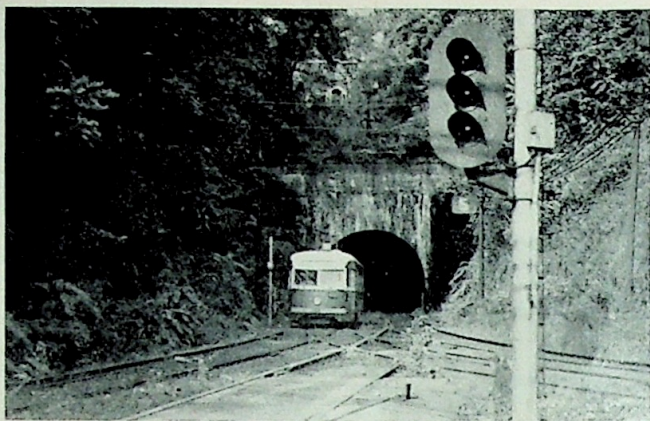


The Rotterdam twins, take over 200.

Urban Transport Economy.

The second requirement of any urban transport system is economy. Not the cheeseparing economy of minimum services, with consequent diversion of all but essential traffic to the roads, where the total expenditure of the erstwhile passengers on their cars, and the community on the roads, will be greater than if public transport carried as much (and not as little) traffic as possible, but rather the economy to the passenger and the community brought about by the use of appropriate transport techniques. After all, a complete rapid transit system itself may be cheaper than the ten-lane road whose loads it will carry!

It is general experience in production industries that a mass production approach will cheapen the individual cost of the product. In a similar manner, in urban transport, the intensive use of a specialised installation rather than a number of less-specialised units will reduce the cost to each passenger. This is discussed further by K. G. Fenelon in 'The Economics of Road Transport,' (Allen and Unwin, 1925). If a sufficiently intense service is needed on an urban route, the cost of



In the suburbs: A tunnel, signals and private track in Pittsburgh, U.S.A.

the specialised installation of track, substations and overhead equipment required is more than offset by the consequent operating economies. These economies arise from the lower "fuel" costs, longer life and reduced maintenance requirements of rapid transit cars compared with other vehicles.

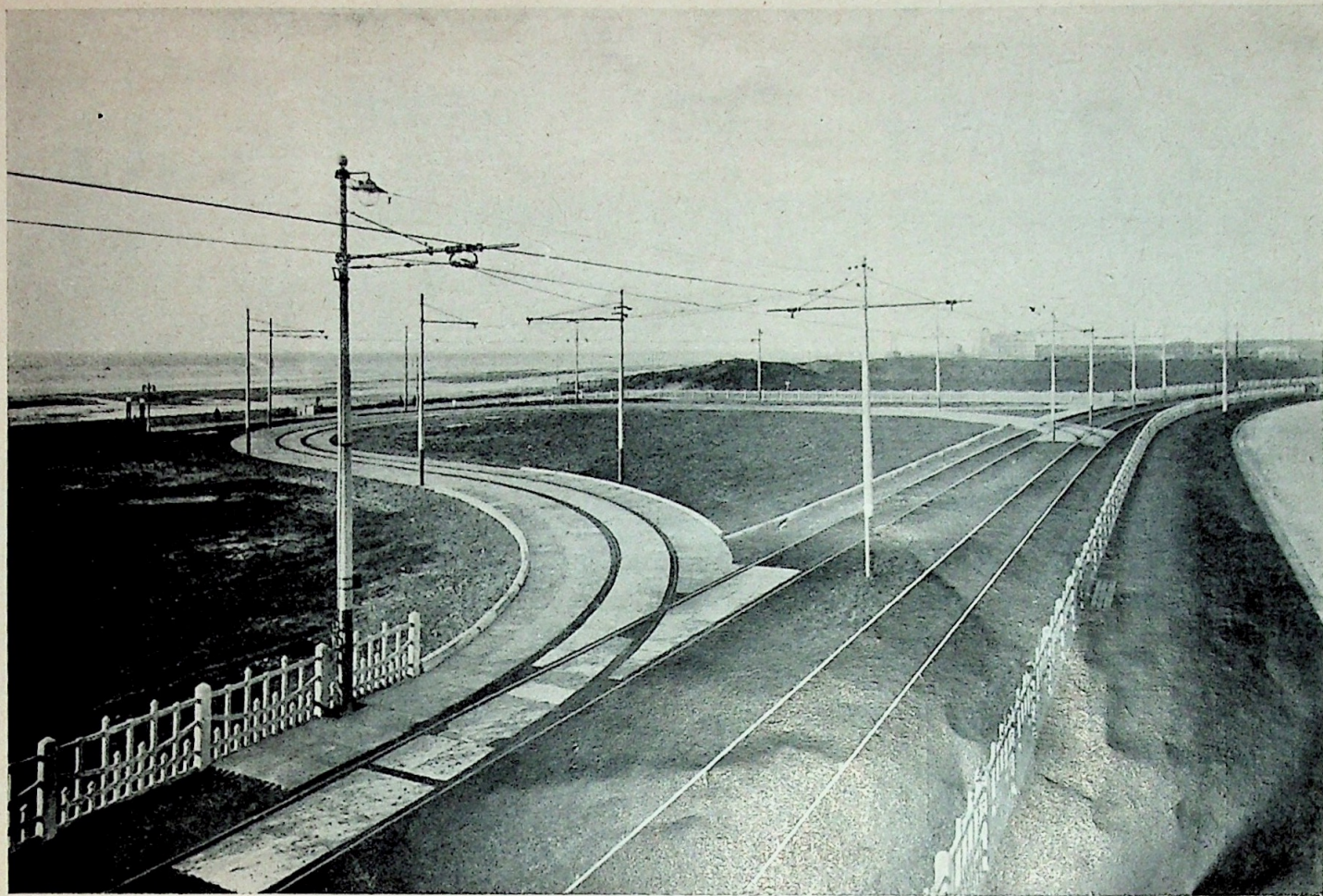
A broad interpretation of a relatively recent economic study ("Urban Transport Costing," in 'Transport World,' 11th June, 1955), shows that where more than 20 or so buses or trolleybuses an hour are required, the railed electric vehicle may well prove cheapest to operate. Such service frequencies are found in most large British cities and conurbations. These certainly suffer from central area

congestion, have fleets of 1,000 or more vehicles, and in some cases possess a whole network of reservations available for public transport in the suburbs. It will thus be seen how great a contribution to urban transport can be made by electricity. In several such towns, and not only in Birmingham, there seems a place for rapid transit: in a few, electric transport, with railed vehicles, is all ready (given the initiative) for upgrading to rapid transit. The construction of new rapid transit reservations as parts of rebuilt roads may only cost about 2 per cent of the price of a public transport subway—and the two lanes so provided will carry as much traffic as ten lanes full of private cars. (These are American figures: "The Right and Wrong Approach to Traffic Congestion," by E. E. Kearns, 'Load,' Sept., 1953). Alternatively, as in Brussels, it may be possible to provide "expressways" for through motor traffic. The remaining, local, traffic will not overload the original road space even when public transport has had its share in reservations.



Much of the success of Brussels' motorways arises from their built-in public transport reservation shown here.

It thus seems that much more consideration should be given in Britain to the possibilities of rapid transit. Boston and Cleveland amongst other North American cities have it. Oslo, Cologne and Gothenburg, amongst other European cities all have examples of



A British Interurban Reservation (Blackpool).

rapid transit. Nearer home, Blackpool (Lancashire) has it on the main coastal route; and the line from Swansea to Mumbles is of similar character. In Britain, Birmingham is actively thinking about it. Since many cities may be forced to it later, would they not do well to adopt it now, and prevent, rather than cure, intolerable urban transport situations?

Operating Economics and Experience.

A major operating advantage arises from the use of electric railcars. Peak-hour operation needs the introduction of extra vehicles, which sometimes represent over half an urban transport fleet and may only be used for an hour or two a day. The use of high-capacity vehicles means that a minimum number of extra vehicles will be needed to augment services. A smaller reserve of little used vehicles will thus suffice and idle capital be cut to a minimum. If, when the system is well established, these little used vehicles are old or obsolescent (and on a new system they could incorporate equipment from tramcars of the previous decade, which would still be sound for their prime purpose of carrying passengers) they may well have earned their purchase price during their period of sustained use on "base" services. (On London Transport railways the highest-capacity trains in use were built in 1920 and rebuilt in 1950). Rapid transit cars, each holding 100 or more, and with 30 or more years of life, are clearly of more value here than 50-70 seat buses of 12-20 years' life.

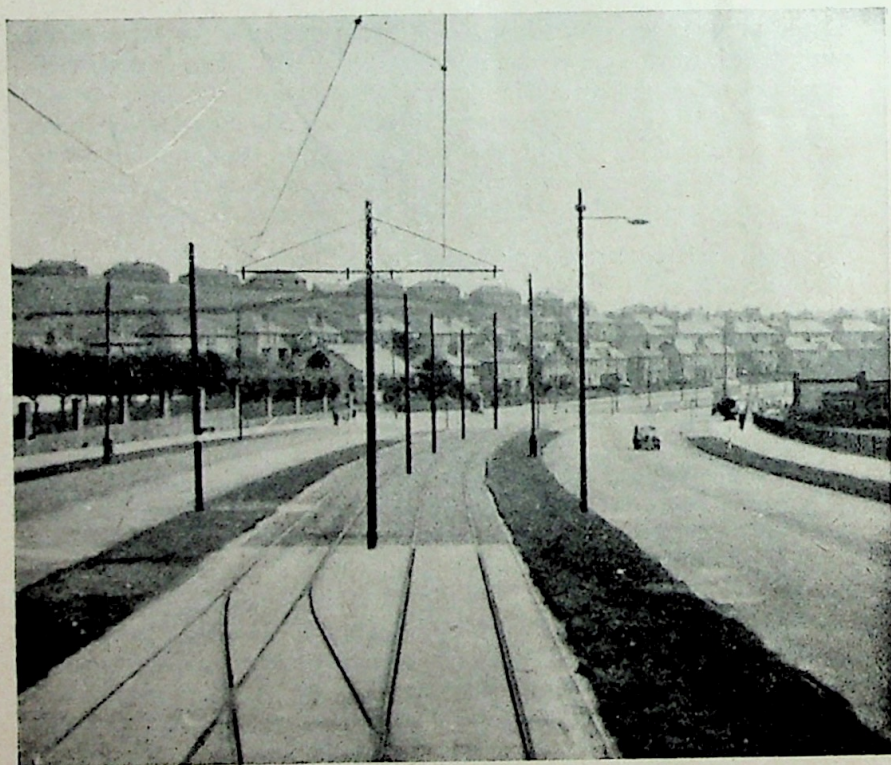
On the basic requirements of capacity and economy with the added advantage of long life and great reliability there is thus a strong case for any undertaking with routes needing over 20 buses an hour, and suffering from city centre congestion, to consider rapid transit and for any undertaking using rails and electricity for its urban transport, to consider retention, development and upgrading until full rapid transit is attained.

In Blackpool there is successful operation of railcoaches on the busiest coastal route of the transport system; in Sheffield the value of rails and electricity in coping with industrial crowds, and with steeply graded routes in northern winter conditions of snow and ice, is doubly appreciated by those who have, in recent years, had oil-bus transport imposed upon them; from Swansea to Mumbles the use of large, comfortable, double-deck railcars on suburban (and even outer-suburban) public transport reservations shows that, even in Britain, the bases of modern rapid transit have found favour. That, in some cases, retrogression to oil buses should ever have been considered causes surprise to many: that recent oil supply troubles should not be seen as writing on the wall and cause reversal of this trend, rather

than merely its temporary suspension, causes even more surprise: rather, with such useful foundations and experience already in being, should there be unhesitant progress towards rapid transit.

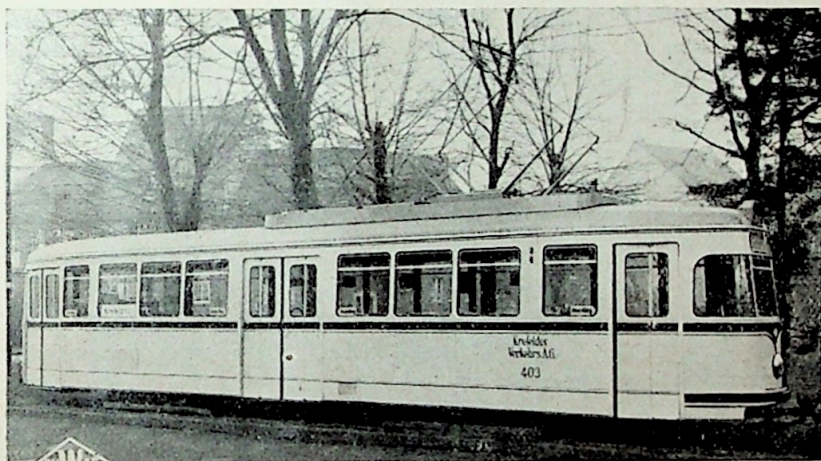
Community Benefits.

To the direct, economic, advantages of rapid transit are also added social benefits to the community it serves. More generous off-peak services may be provided economically by electric transport, as the peak services will be paying for the fixed equipment and the incremental cost of off-peak services will be low. Generous off-peak services, which are costly to provide with oil buses, will ease the lot of housewives, students and pleasure-bound travellers, and may attract a sufficiency of extra revenue and public goodwill to have a beneficial effect on the undertaking.



Potential Rapid Transit in Britain: A Glasgow reservation, built 1949 as part of the 50-year rapid-transit plan then current.

The citizen will have the reliability of the railed vehicle whatever the weather. Ice and snow—even fog—have little effect on properly designed rapid transit. The citizen, as a motorist, will further enjoy town roads that are no longer congested by frequently stopping public service vehicles—and as a public transport patron, he will enjoy rapid transit along arteries reserved entirely for him and his fellows. In fact, the motorist may gain the best of both forms of transport: when he sees that use of rapid transit can relieve him of the strain of city driving he will “park and ride” (as is said in America), using his car only to a rapid transit halt in the suburbs. Moreover, he will appreciate that rapid transit is not competing with him for oil-fuel, of which supplies may become scarce for non-commercial reasons, as suggested in ‘The Motor,’ of 19th December, 1956 (p. 826).



The German standard tramcar, 1954. (This one in Krefeld.)

Comfort will be offered by rapid transit vehicles. To the fundamental smoothness of railway travel they add their intrinsically smooth, noiseless performance, without jerking gear boxes and thudding oil engines. Nor will they cause smell and atmospheric pollution in city streets. Rapid transit patrons will be able to read their newspapers in comfort on their journey.

Citizens want safe urban transport: their vehicles should not be death-dealing. Comparable British figures, given in ‘Passenger Transport’ for 13th January, 1954, are that Blackpool railcoaches, on a vehicle-mile basis, are involved in as few as one-sixth of the

accidents as are the buses in Birmingham. This sort of comparison is significant and vitiates contentions that rail vehicles are fundamentally unsafe.

For several reasons the use of electric transport reduces the real cost of transport to a community. Instead of paying for heavily taxed fuel-oil and rubber tyres, both of foreign origin, passengers pay for locally produced electricity and British steel rails. Much more of the money paid in fares thus recirculates within the community, and all of it within the nation. Payment for these items thus helps to maintain local as well as national employment. Improvement of the load factor of the electrical system—for transport and industrial peak loads do not coincide—contributes towards the possibility of low charges for electrical energy and the earlier success of atomic power stations which, above all, need high load factor.

Further reduction in the real cost of transport arises through payment of rates on right of way, substations and overhead equipment (though in practice this may be unfair to the undertaking concerned). Transport users are thus in effect paying some of their rates through transport, rather than directly, so rapid transit systems perforce give rate relief in their area to a much greater extent than do buses, or even trolleybuses.

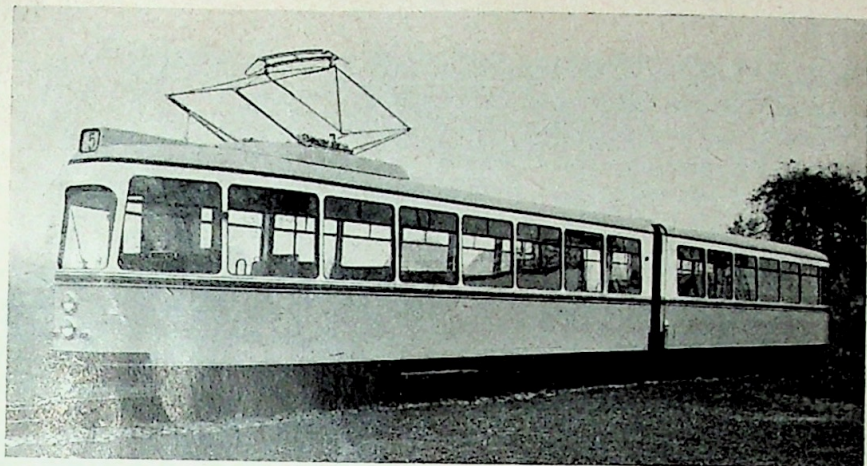
Operators' Benefits.

The problems of municipal management are somewhat reduced by the use of electric methods of urban transport: once the Ministry of Transport has authorised operation, the municipality operates with little restraint. Timetables can be altered, "extras" provided, and day-to-day alterations made to the operation of the system as the vagaries of traffic require: no applications to a Licensing Authority are needed.

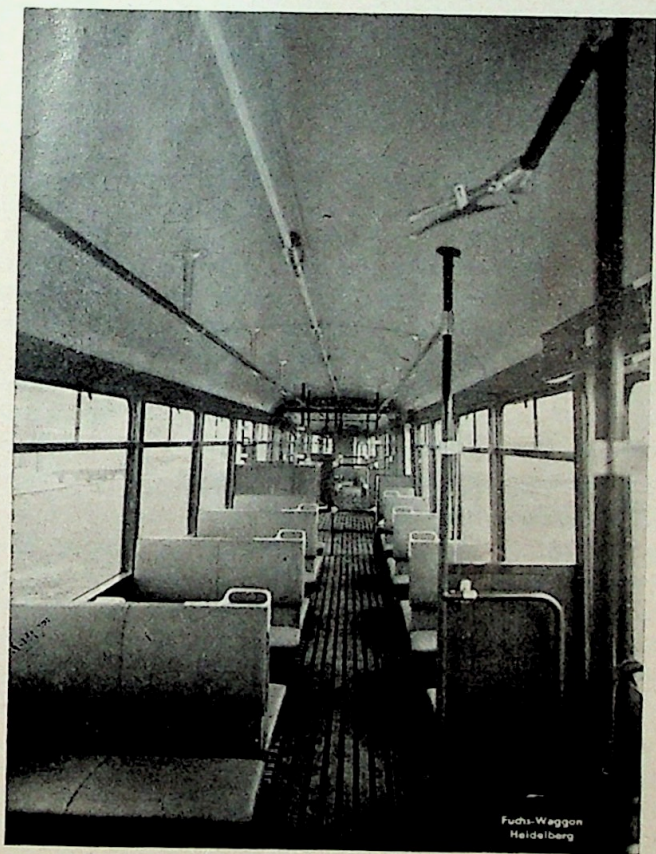
Rapid transit motormen need no Public Service Vehicle Licence. Their training (by the undertaking) does not suit them for alternative employment: there will thus be a much smaller employee turnover in a rapid transit undertaking. (Oil bus drivers tend to leave for higher pay in road haulage.)

The safety of rapid transit ensures a low level of injury compensation payments.

If use is made of a railed reserved-track electric transport system—for this is what we mean by rapid transit—with fixed routes, transport planning can be deliberately associated with town planning and traffic requirements. With a cheap and frequent service available on



The Stuttgart twins: A 200-passenger articulated car: exterior and interior.



Fuchs-Waggon
Heidelberg

a fixed route, the public seems willing to walk quite a distance to use the service: traffic from farther afield may be tapped by the use of feeder tram or bus services (as at Stockholm), or by providing car parks at outer suburban points (as at Cleveland, U.S.A.). With the so called "more flexible" buses, there often arise demands, backed by strong local pressure, to divert or extend routes to give vociferous minorities an almost doorstep service—to the detriment of the economics of the system. With rapid transit, extensions or diversions to new housing estates, etc., can be confined to those which, as well as being economically sound (at any rate on an incremental-cost basis), will truly provide the greatest good to the greatest number of potential patrons.

Thus, whilst the initial planning of a rapid transit system requires some effort (much reduced if use is made of tramway reservations and electrical equipment already existing in a form ripe for upgrading as traffic increases), a progressive management, relatively unfettered, can make such a system well and truly serve the best interests of its community.

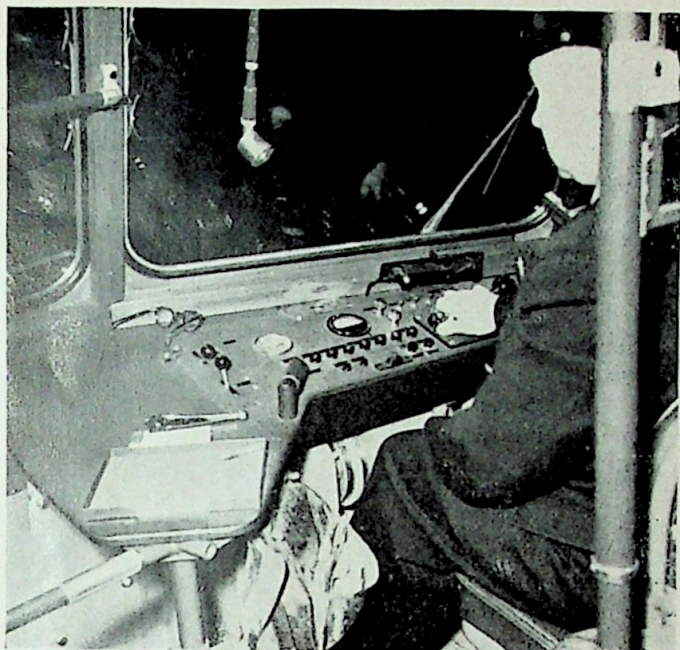
Operatives' Benefits.

Drivers and conductors naturally share with the passengers the greater comfort and smoothness of an electric railcar compared with any form of bus. The driver, in addition, is relieved of all steering strain and, on the rapid transit reservation, has few worries that other vehicles might get in the way. No gear lever, clutch pedal, or other such controls are necessary: just one control: one move to accelerate and another to brake—from smooth and rapid acceleration to smooth and firm emergency braking in a fraction of a second with one sweep of the hand or shift of the foot, so simple are the latest control equipments. Moreover, a "deadman" control, as on electric railways, can easily be added: with this to stop the car, and rails to guide it, there is no possibility of a queue being mown down through a driver's temporary "blackout."

With "glideaway" performance of this sort it suffices, on a clear track, just to operate the control fully: a maximum of performance can thus be obtained with a minimum of strain to the driver. The high safety record of railcars is also of direct interest to driver and conductor.

The Future and Rapid Transit.

A modern German trio, as illustrated (p. 22), indicates the sort of vehicles which can be applied to solve urban transport and city congestion problems and take advantage of cheap atomic power of the



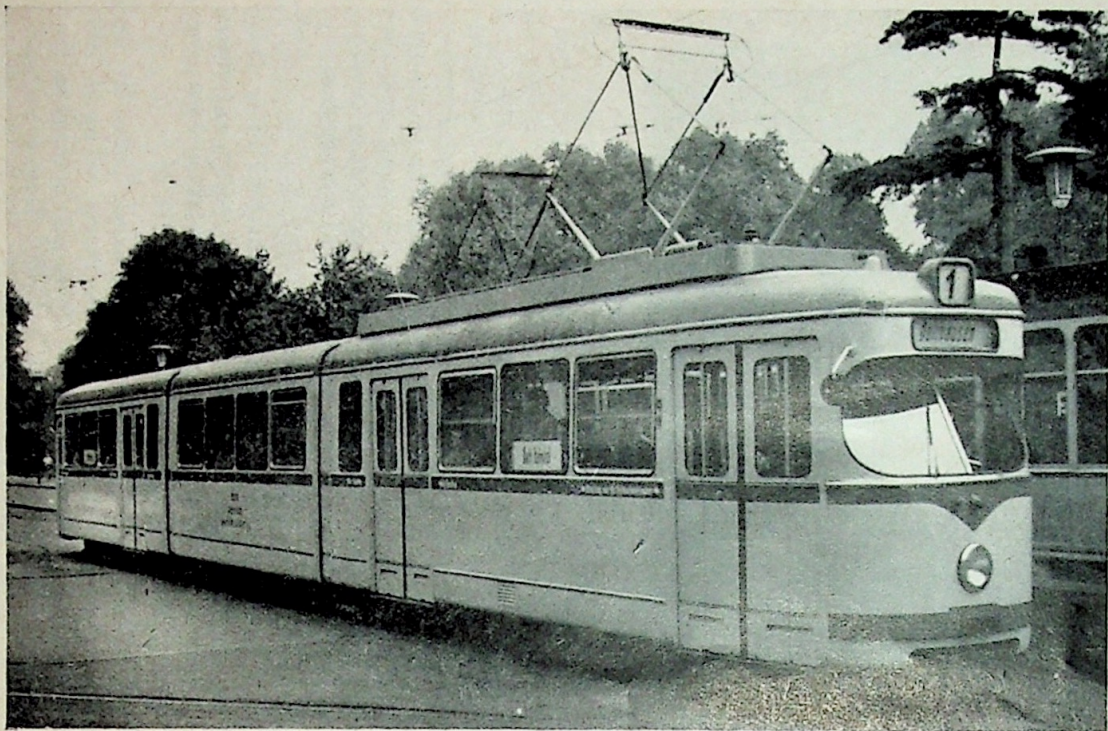
CREW COMFORT.

The driver's cab in a modern Swedish tramcar.

future. Such vehicles with glideaway performance, rubber-insert wheels for silence, and speeds of 45 m.p.h. or more, prove popular with the public (traffic has invariably increased after their introduction). As a 30-year investment—with possibility even then of refurbishing for peak services—these 250-passenger three-car trains compare very favourably with the 56-seat, 12-year investment of a conventional bus, or even the 70-seat, 20-year investment of a trolleybus.

And so, if any main route of an undertaking needs 20 or so buses per hour, and suffers from city congestion, a detailed study should be made to see if a public transport reservation and its operation by rapid transit methods would not prove the cheapest and best way for the community to provide its service.

Where electric railed vehicles with segregated paths are already operated, as many extensions as possible should be made, and the good suburban features progressively developed inwards to the city centre, until true rapid transit has evolved. Associated tram and bus routes should progressively be diverted, as in Stockholm, to increase to a maximum the proportion of passengers carried by rapid transit. With such a system, planned and operated as an entity, full



The Düsseldorf Triplets: A 250-passenger three-section car in Germany.

advantage could be taken of the subsidiary benefits of electric rail transport.

The community would have transport at low fares; it would find its transport reliable, safe and comfortable; a source neither of traffic congestion, nor noise and fumes; it would find much of its transport expenditure recirculated, maintaining local employment; it would find electricity prices at a minimum; and would benefit from rate relief. The operators would find a system easy to manage, with employees trained truly to their needs. The operatives would find secure jobs in vehicles both comfortable and easy to handle.

In due time, the benefits of atomic power and of urban transport reservations would thus be passed to the town through its rapid transit system, developed to the full through the foresight and tenacity of its management. Rapid transit could have a place in quite a number of British cities and conurbations which are to-day not only acutely aware of their transport problems, despite their public pronouncements, but also far from confident that they have found the right solution.

It is thus very important that those in charge of urban transport policy in these areas should acquire flexibility in their outlook rather than in their vehicles, and that they should now give serious consideration to both the future and rapid transit.

This booklet is published by the
LIGHT RAILWAY TRANSPORT LEAGUE

advocating the retention, development and expansion of tramways
and light railways.

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BUILT-IN RAPID TRANSIT FOR URBAN TRANSPORT IN THE FUTURE.

Toronto, 1958. *Above:* Rapid transit reservation from station bridge.
Below: Flyovers keep public transport segregated.

